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EXAMINER	
CAMPOS, YAIMA	
ART UNIT	**PAPER NUMBER**
2185	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/767,247	WATANABE, NAOKI	
	Examiner	Art Unit	
	Yaima Campos	2185	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

RESPONSE TO AMENDMENT

1. The examiner acknowledges the applicant's submission of the amendment dated March 27, 2007. At this point claims 1 and 10 have been amended and claims 23 and 24 have been added. There are 24 claims pending in the application; there are 2 independent claims and 22 dependent claims, all of which are ready for examination by the examiner.

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 1-20 and 23-24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bridge (US 6,530,035) in view of Iwami et al. (US 2002/0112030) and Ohran et al. (US 2002/0112134).

4. As per **claim 1**, Bridge discloses "A method of controlling a storage system having primary storage volumes and replication storage volumes which replication storage volumes improve reliability of the storage system," as [**"the invention relates to a method and system for managing storage systems containing multiple storage devices" (Column 1, lines 9-11) and also that "to protect against the loss of information, data on the system can be *mirrored* (i.e., duplicated and stored) on two or more separate storage locations" (Column 1, lines 50-52). Bridge also explains that "if a disk drive fails, protected extents can be rebuilt from**

that disk drive's mirror partners" (Column 14, lines 53-54) and that "this reduces the meantime to repair the failure with a hot standby, since a higher I/O rate can be used to reconstruct lost data" (Column 14, lines 56-58) wherein "a lower mean time to repair reduces the probability of having two simultaneous failures" (Column 14, lines 61-62); therefore, providing higher reliability in a storage system]

"the method comprising: determining a boundary of a failure of the primary storage volumes and the replication storage volumes;" **[With respect to this limitation, Bridge discloses an equivalent method wherein "each disk drive is associated with a failure group. Two disk drives are in different failure groups if they do not share a common failure condition that is projected to affect both disk drives at the same time" (Column 2, lines 42-46) as failure groups encompass different failure boundaries]** using the determined boundary to assign replication storage volumes **[Bridge discloses "for mirroring, each disk drive is paired with one or more disk drives from other failure groups" (Column 2, 51-52) so that "two independent failures would be required to destroy both pieces of the data" (Column 4, lines 32-33); therefore, a mirror copy of a drive belongs in a different failure boundary as its mirror pair]**

<u>the boundary being determined using controller group information</u> **["two disk drives on a common controller could be considered part of the same failure group for a high reliability mirrored data system" (Figure 6 and Column 15, lines 2-4) as including control group information].**

Bridge does not disclose expressly the boundary being determined using error correction group of the primary storage volumes and replication storage volumes to divide the storage

volumes into failure groups of logical volumes nor using the determined failure boundary and a type of content to be stored to assign replication storage volumes, a first type of content to be stored having replication storage volumes assigned across the failure boundary, and a second type of content to be stored having replication storage volume within the failure boundary.

Iwami discloses the boundary being determined using error correction group of the primary storage volumes and replication storage volumes to divide the storage volumes into failure groups of logical volumes as [**"the ECC configuration table 208 is searched for available resources from which a suitable disk may be created... it is determined whether a logical disk was successfully created from the available resources of the ECC group controlled by the ECC configuration table 208. If a logical disk was successfully created, then in step 306, the new disk is assigned according to the request" (Page 3, Par. 0032; Figure 3 and related text) and explains "logical disk definitions" in which "Each entry comprises a logical disk ID 501, an Error Checking and Correcting (ECC) group ID 502, a data volume 503, a data speed 504 and an indicators of whether the logical disk has been assigned. An ECC group is comprised of physical disks" (Pages 3-4, Par. 0036-0037; Figures 5-6 and related text)**].

Ohran discloses using the determined failure boundary and a type of content to be stored to assign replication storage volumes, a first type of content to be stored having replication storage volumes assigned across the failure boundary, and a second type of content to be stored having replication storage volume within the failure boundary as [**"one of the simplest approaches to creating a backup copy of a large volume of computer data is to copy the data from a mass storage system to an archival device, such as one or more magnetic**

tapes" (Page 1, Par. 0008) and explains "data blocks that are to be overwritten after a point in time in which a mirrored copy of the data has been created are stored in a preservation memory" (Page 2, Par. 0026) wherein "preservation memory 14 is a physical or logical device associated with computer 10 in which data blocks that are to be overwritten in mass storage device are stored. Preservation memory 14 can be a volatile device, such as a random access memory (RAM) or any other device that can store data blocks that are to overwritten in mass storage device 12. Although preservation memory 14 is illustrated as being a separate device in Fig. 1, the preservation memory can be a partition or another portion of mass storage device 12" (Page 3, Par. 0029) wherein "as the volume of data stored in the preservation memory approaches the capacity of preservation memory, a full mirror or backup operation is performed on the mass storage device" (Page 4, Par. 0047)].

Bridge (US 6,530,035), Iwami et al. (US 2002/0112030) and Ohran et al. (US 2002/0112134) are analogous art because they are from the same field of endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the method of controlling a storage system having primary storage volumes and replication storage volumes in which a boundary of failure used to assign replication storage volumes to assure that at least some of the replication storage volumes are outside the failure boundary as taught by Bridge, assign/create logical volumes using error correction groups as taught by Iwami and further use the determined <u>failure</u> boundary <u>and a type of content to be stored</u> to assign replication storage volumes, <u>a first type of content to be stored having replication</u>

storage volumes assigned across the failure boundary, and a second type of content to be stored having replication storage volume within the failure boundary as taught by Ohran.

The motivation for doing so would have been because Iwami discloses that using error correction group to divide storage volumes into failure groups of logical volumes [**to "assign disk in storage that have sufficient data access speed to accommodate a communication data speed of network resources" (Page 7, Par. 0064) wherein "storage resources are matched to communications capabilities to provide for improved storage system throughput capability" (Page 2, Par. 0012) thereby creating logical groups/volumes which differ from other logical volumes according to different characteristics such as ECC group characteristics**]. Ohran discloses using the determined failure boundary and a type of content to be stored to assign replication storage volumes, a first type of content to be stored having replication storage volumes assigned across the failure boundary, and a second type of content to be stored having replication storage volume within the failure boundary is done so that [**"data can be restored to a state that is newer than that associated with a full mirrored or archived copy of the data. Thus, full mirror or archiving operation on a volume or data can be less frequent without the risk of losing changes to the volume of data that have occurred since the last full mirror or archiving operation" (Page 1, Par. 0012)**].

Therefore, it would have been obvious to combine Iwami et al. (US 2002/0112030) with Bridge (US 6,530,035) and Ohran et al. (US 2002/0112134) for the benefit of creating a method of controlling a storage system having primary storage volumes and replication storage volumes to obtain the invention as specified in claim 1.

5. As per **claim 2**, the combination of Bridge, Iwami and Ohran discloses "A method as in claim 1," **[See rejection to claim 1 above]** "wherein the failure boundary is determined by software managing the storage system" **[With respect to this limitation, Bridge discloses that "all named drives in a failure group share some common disk drive failure criteria, which is any failure mode or condition which is projected to cause the related disk drives to fail at the same time period" (Column 13, lines 35-38) and explains that "hard-wired circuitry may be used in place of or in combination with software instructions to implement the invention" (Column 26, lines 36-40)]**.

6. As per **claim 3**, the combination of Bridge, Iwami and Ohran discloses "A method as in claim 2" **[See rejection to claim 2 above]** "wherein a logical address of locations in the storage system is used to determine the failure boundary" **[With respect to this limitation, Bridge discloses that "the logical volume manager configures a pool of disk drives into logical volumes (also called logical disks) so that applications and users interface with logical volumes instead of directly accessing physical disk drives" (Column 1, lines 24-27)]**.

7. As per **claim 4**, the combination of Bridge, Iwami and Ohran discloses "A method as in claim 1" **[See rejection to claim 1 above]** "wherein there are a plurality of failure boundaries and each is determined by software managing the storage system" **[With respect to this limitation, Bridge discloses that "all named drives in a failure group share some common disk drive failure criteria, which is any failure mode or condition which is projected to cause the related disk drives to fail at the same time period" (Column 13, lines 35-38) wherein "there should be at least two failure-groups to implement proper redundancy" (Column 14, lines 55-57) and explains that "hard-wired circuitry may be used in place of or**

in combination with software instructions to implement the invention" (Column 26, lines 36-40)].

8. As per **claims 5-6 and 11-12**, the combination of Bridge, Iwami and Ohran discloses "A method as in claims 4 and 10" **[See rejection to claim 4 above and rejection to claim 10 bellow]** "wherein information regarding the failure boundaries is stored as a table in the server" and "the server is used to manage the storage system" **[With respect to this limitation, Bridge discloses that "a separate list is maintained for each disk drive with entries that describe each allocation unit on that disk drive. The example of FIG. 4 illustrates one embodiment of this list which is referred to as an *allocation table*" (Figure 4 and Column 10, lines 13-17) wherein "if a disk drive fails, the surviving allocation tables can be used to reconstruct any pointer extent on the failed device containing entries for allocation units on surviving devices" (Column 10, lines 41-44) and also explains that when a disk drive fails, "reconstruction can be accomplished by looking at the mirror partner's allocation tables. Thus no other disk drives need to be examined" (Column 14, lines 58-61) as storing failure boundary information for both, primary and secondary (or mirror) volumes of data on each disk; therefore, each disk functions as a server for other disks in the system as each disk stores data pertaining to other disks. Bridge further discloses that "a server might transmit a requested code for an application program through Internet, ISP, local network and communication interface. In accordance with the invention, one such downloaded application manages storage systems that contain multiple data storage devices" (Figure 19 and Column 27, lines 43-49). Furthermore, Iwami discloses "logical disk configuration**

table" (Figure 5 and related text) and other resource allocation tables which reside in "memory 112" (Figure 2 and related text)].

9. As per **claims 7 and 13**, the combination of Bridge, Iwami and Ohran discloses "A method/system as in claims 5 and 11" **[See rejection to claim 5 above and rejection to claim 11 bellow]** "wherein information regarding the failure boundaries also includes information about reliability of the primary storage volumes and the replication storage volumes" **[Bridge discloses this limitation as "two disk drives on a common controller could be considered part of the same failure group for a high-reliability mirrored data system, but may be considered in two separate failure groups for a system having lower demand-levels for reliability" (Column 15, lines 2-6) as taking reliability information for each failure group into account].**

10. As per **claim 8**, the combination of Bridge, Iwami and Ohran discloses "A method as in claim 1" **[See rejection to claim 1 above]** "wherein the boundary of the failure is used to assign storage volumes as replication storage volumes for a particular operation of the storage system" **[Bridge discloses this limitation as "for mirroring, each disk drive is paired with one or more disk drives from other failure groups" (Column 2, 51-52) so that "two independent failures would be required to destroy both pieces of the data" (Column 4, lines 32-33); therefore, a mirror copy of a drive belongs in a different failure boundary as its mirror pair and failure boundary information is used to assign a mirror pair for a data volume].**

11. As per **claim 9**, the combination of Bridge and Iwami discloses "A method as in claim 8" **[See rejection to claim 8 above]** "wherein information relating to the boundary of the failure includes error correction group and controller group information for each of the primary storage

volumes and the replication storage volumes" [**With respect to this limitation, Bridge discloses "using mirror partners also limit the chances of multiple-drive failures damaging a parity protected extent. A parity set is allocated by picking any disk drive as the primary disk to hold the parity extent and then allocating the data extents on its mirror partners. Each data extent should be located on a mirror partner that is in a different failure group from other extents in the parity set" (Column 14, lines 34-40) as including error correction information and further explains that "two disk drives on a common controller could be considered part of the same failure group for a high reliability mirrored data system" (Figure 6 and Column 15, lines 2-4) as including control group information. Furthermore, Iwami discloses "the ECC configuration table 208 is searched for available resources from which a suitable disk may be created... it is determined whether a logical disk was successfully created from the available resources of the ECC group controlled by the ECC configuration table 208. If a logical disk was successfully created, then in step 306, the new disk is assigned according to the request" (Page 3, Par. 0032; Figure 3 and related text)**].

12. As per **claim 10**, Bridge discloses "A storage system comprising: a set of primary storage volumes; a set of replication storage volumes for improving reliability of the storage system;" as [**"the invention relates to a method and system for managing storage systems containing multiple storage devices" (Column 1, lines 9-11) and also that "to protect against the loss of information, data on the system can be *mirrored* (i.e., duplicated and stored) on two or more separate storage locations" (Column 1, lines 50-52). Bridge also explains that "if a disk drive fails, protected extents can be rebuilt from that disk drive's mirror partners" (Column 14, lines 53-54) and that "this reduces the meantime to repair the failure with a**

hot standby, since a higher I/O rate can be used to reconstruct lost data" (Column 14, lines 56-58) wherein "a lower mean time to repair reduces the probability of having two simultaneous failures" (Column 14, lines 61-62); therefore, providing higher reliability in a storage system]

"a memory for storing information regarding at least one boundary of a potential failure of the primary storage volumes and the replication storage volumes;" **[With respect tot this limitations, Bridge discloses having "allocation tables" wherein "if a disk drive fails, the surviving allocation tables can be used to reconstruct any pointer extent on the failed device containing entries for allocation units on surviving devices" (Column 10, lines 41-44) and also explains that when a disk drive fails, "reconstruction can be accomplished by looking at the mirror partner's allocation tables. Thus no other disk drives need to be examined" (Column 14, lines 58-61) as storing failure boundary information for both, primary and secondary (or mirror) volumes of data]**

"using the determined boundary to assign replication storage volumes **[Bridge discloses "for mirroring, each disk drive is paired with one or more disk drives from other failure groups" (Column 2, 51-52) so that "two independent failures would be required to destroy both pieces of the data" (Column 4, lines 32-33); therefore, a mirror copy of a drive belongs in a different failure boundary as its mirror pair]**

<u>the boundary being determined using controller group information</u> **["two disk drives on a common controller could be considered part of the same failure group for a high reliability mirrored data system" (Figure 6 and Column 15, lines 2-4) as including control group information].**

Bridge does not disclose expressly the boundary being determined using error correction group of the primary storage volumes and replication storage volumes to divide the storage volumes into failure groups of logical volumes nor using the determined failure boundary and a type of content to be stored to assign replication storage volumes, a first type of content to be stored having replication storage volumes assigned across the failure boundary, and a second type of content to be stored having replication storage volume within the failure boundary.

Iwami discloses the boundary being determined using error correction group of the primary storage volumes and replication storage volumes to divide the storage volumes into failure groups of logical volumes as [**"the ECC configuration table 208 is searched for available resources from which a suitable disk may be created... it is determined whether a logical disk was successfully created from the available resources of the ECC group controlled by the ECC configuration table 208. If a logical disk was successfully created, then in step 306, the new disk is assigned according to the request" (Page 3, Par. 0032; Figure 3 and related text) and explains "logical disk definitions" in which "Each entry comprises a logical disk ID 501, an Error Checking and Correcting (ECC) group ID 502, a data volume 503, a data speed 504 and an indicators of whether the logical disk has been assigned. An ECC group is comprised of physical disks" (Pages 3-4, Par. 0036-0037; Figures 5-6 and related text)**].

Ohran discloses using the determined failure boundary and a type of content to be stored to assign replication storage volumes, a first type of content to be stored having replication storage volumes assigned across the failure boundary, and a second type of content to be stored having replication storage volume within the failure boundary as [**"one of the simplest**

approaches to creating a backup copy of a large volume of computer data is to copy the data from a mass storage system to an archival device, such as one or more magnetic tapes" (Page 1, Par. 0008) and explains "data blocks that are to be overwritten after a point in time in which a mirrored copy of the data has been created are stored in a preservation memory" (Page 2, Par. 0026) wherein "preservation memory 14 is a physical or logical device associated with computer 10 in which data blocks that are to be overwritten in mass storage device are stored. Preservation memory 14 can be a volatile device, such as a random access memory (RAM) or any other device that can store data blocks that are to overwritten in mass storage device 12. Although preservation memory 14 is illustrated as being a separate device in Fig. 1, the preservation memory can be a partition or another portion of mass storage device 12" (Page 3, Par. 0029) wherein "as the volume of data stored in the preservation memory approaches the capacity of preservation memory, a full mirror or backup operation is performed on the mass storage device" (Page 4, Par. 0047)].

Bridge (US 6,530,035), Iwami et al. (US 2002/0112030) and Ohran et al. (US 2002/0112134) are analogous art because they are from the same field of endeavor of computer memory access and control.

At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify the method of controlling a storage system having primary storage volumes and replication storage volumes in which a boundary of failure used to assign replication storage volumes to assure that at least some of the replication storage volumes are outside the failure boundary as taught by Bridge, assign/create logical volumes using error correction groups as

taught by Iwami and further use the determined failure boundary and a type of content to be stored to assign replication storage volumes, a first type of content to be stored having replication storage volumes assigned across the failure boundary, and a second type of content to be stored having replication storage volume within the failure boundary as taught by Ohran.

The motivation for doing so would have been because Iwami discloses that using error correction group to divide storage volumes into failure groups of logical volumes **[to "assign disk in storage that have sufficient data access speed to accommodate a communication data speed of network resources" (Page 7, Par. 0064) wherein "storage resources are matched to communications capabilities to provide for improved storage system throughput capability" (Page 2, Par. 0012) thereby creating logical groups/volumes which differ from other logical volumes according to different characteristics such as ECC group characteristics]**. Ohran discloses using the determined failure boundary and a type of content to be stored to assign replication storage volumes, a first type of content to be stored having replication storage volumes assigned across the failure boundary, and a second type of content to be stored having replication storage volume within the failure boundary is done so that **["data can be restored to a state that is newer than that associated with a full mirrored or archived copy of the data. Thus, full mirror or archiving operation on a volume or data can be less frequent without the risk of losing changes to the volume of data that have occurred since the last full mirror or archiving operation" (Page 1, Par. 0012)]**.

Therefore, it would have been obvious to combine Iwami et al. (US 2002/0112030) with Bridge (US 6,530,035) and Ohran et al. (US 2002/0112134) for the benefit of creating a method of

controlling a storage system having primary storage volumes and replication storage volumes to obtain the invention as specified in claim 10.

13. As per **claim 14**, the combination of Bridge, Iwami and Ohran discloses "A storage system as in claim 11" **[See rejection to claim 11 above]** "wherein information regarding the failure boundaries also includes information about performance of the primary and replication storage volumes" **[With respect to this limitation, Bridge discloses that "the size of allocation units is selected for desired performance characteristics. One factor to consider in this selection is the I/O performance of the disk drive(s) containing the allocation units" (Column 7, lines 16-19) and also explains that "pointer extents can be in a different disk group from data extents. This is useful for cases where one disk group has different performance characteristics than another" (Column 9, lines 48-50) as taking performance information for each failure group into account]**.

14. As per **claims 15 and 18**, the combination of Bridge, Iwami and Ohran discloses a method as in claims 1 and 10 **[See rejection to claims 1 and 10 above]** wherein the boundary of a failure is determined based on logical addresses **[Iwami discloses this limitation as "logical disk configuration table" comprising entries of one or more logical disk definitions (Figure 5 and related text)]**.

15. As per **claims 16 and 19**, the combination of Bridge, Iwami and Ohran discloses a method as in claims 15 and 18 wherein the logical addresses correspond to volume numbers or error correction groups **[Iwami discloses this limitation as "logical disk definitions" in which "each entry comprises a logical disk ID 501, an Error Checking and Correcting (ECC) group ID 502, a data volume 503" (Figure 5 and related text)]**.

16. As per **claims 17 and 20** the combination of Bridge, Iwami and Ohran discloses "A method as in claim 1" **[See rejection to claims 1 and 10 above]** "further comprising: performing a replication process between the primary replication volumes and secondary storage volumes, the replication process utilizing a daily or hybrid backup implementation" as **[data is stored to preservation memory as changes are made after a full backup operation (Page 2, Par. 0026) and explains having data that changes frequently, for example, on a daily basis (Page 1, Pars. 0005 and 0010)]**.

17. As per **claims 23 and 24** (new), the combination of Bridge, Iwami and Ohran discloses a method/storage system as in claims 1 and 10 wherein the first type of content to be stored is a full backup of data and the second type of content to be stored is a differential backup of data as **["data blocks that are to be overwritten after a point in time in which a mirrored copy of the data has been created are stored in a preservation memory" (Page 2, Par. 0026) wherein "preservation memory 14 is a physical or logical device associated with computer 10 in which data blocks that are to be overwritten in mass storage device are stored. Preservation memory 14 can be a volatile device, such as a random access memory (RAM) or any other device that can store data blocks that are to overwritten in mass storage device 12. Although preservation memory 14 is illustrated as being a separate device in Fig. 1, the preservation memory can be a partition or another portion of mass storage device 12" (Page 3, Par. 0029) wherein "as the volume of data stored in the preservation memory approaches the capacity of preservation memory, a full mirror or backup operation is performed on the mass storage device" (Page 4, Par. 0047)]**.

18. **Claims 21 and 22** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bridge (US 6,530,035) in view of Iwami et al. (US 2002/0112030) and Ohran et al. (US 2002/0112134).

19. As per **claims 21 and 22**, the combination of Bridge and Iwami discloses the method/system as in claims 1 and 10 **[See rejection to claims 1 and 10 above]** but does not disclose expressly "the primary storage volumes and replication storage volumes are horizontally or vertically addressed."

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use horizontal, vertical, or another form of addressing well known in the field of endeavor as Applicant's own disclosure explains that **["the server 106 uses address to indicate horizontal, vertical, or some other form" (Paragraph 0043) and also explains that "in the case of vertical addressing the impact of replication is the same as with example of horizontal addressing; the only differences are the physical arrangement of the storage volumes" (Paragraph 0033)]**.

Therefore, it would have been obvious to use any addressing form for the benefit of creating a method of controlling storage system replication to obtain the invention as specified in claim 21 and 22.

RELEVANT ART CITED BY THE EXAMINER

20. The following prior art made of record and not relied upon is cited to establish the level of skill in the applicant's art and those arts considered reasonably pertinent to applicant's disclosure. See **MPEP 707.05(c)**.

21. The following reference teaches having snapshot-copy LUN remaining within a primary logical unit comprises a single point of failure.

U.S. PATENT NUMBER

US 6,907,505

ACKNOWLEDGMENT OF ISSUES RAISED BY THE APPLICANT

Response to Amendment

22. Applicant's arguments filed March 27, 2007 have been fully considered but are moot in view of the new ground(s) of rejection.

23. As required by **M.P.E.P. § 707.07(f)**, a response to these arguments appears below.

ARGUMENTS CONCERNING PRIOR ART REJECTIONS

24. All arguments by the applicant are believed to be covered in the body of the office action and thus, this action constitutes a complete response to the issues raised in the remarks dated March 27, 2007.

CLOSING COMMENTS

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

STATUS OF CLAIMS IN THE APPLICATION

25. The following is a summary of the treatment and status of all claims in the application as recommended by **M.P.E.P. § 707.07(i)**

a(1) CLAIMS REJECTED IN THE APPLICATION

26. Per the instant office action, **claims 1-24** have received a second action on the merits and are subject of a final rejection.

DIRECTION OF ALL FUTURE REMARKS

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yaima Campos whose telephone number is (571) 272-1232. The examiner can normally be reached on Monday to Friday 8:30 AM to 5:00 PM.

IMPORTANT NOTE

28. If attempts to reach the above noted Examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Sanjiv Shah, can be reached at the following telephone number: Area Code (571) 272-4098.

29. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

May 22, 2007

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